(19) Korean Intellectual Property Office (KR)

(12) Registered Patent Publication (B1)

(45) Publication date: May 15, 1999

(11) Publication no. 10-0176109

(24) Registration date: November 12, 1998

(21) Application no.: 10-1996-0012715

(22) Application date: April 24, 1996

(65) Laid-open no.: P1997-0072741

(43) Laid-open date: November 7, 1997

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(54) **CDMA WIRELESS CHANNEL ALLOCATION METHOD ENABLING HANDOFF CHANNEL RESERVATION**

ABSTRACT

The present invention relates to a CDMA wireless channel allocation method enabling a handoff reservation.

The prior art has a problem in that, in the case of variable link capacity, it is difficult to reserve a dedicated handoff channel. Therefore, the present invention subtracts the currently received interference from two total interference margins set by the BS, classifies two signal intensity margins, and allocates a wireless channel accordingly so that a dedicated handoff channel can be reserved.

SPECIFICATION

[TITLE OF THE INVENTION]

CDMA WIRELESS CHANNEL ALLOCATION METHOD ENABLING HANDOFF CHANNEL RESERVATION

[BRIEF DESCRIPTION OF THE DRAWINGS]

FIG. 1 shows the construction of a BS receiver for wireless channel allocation according to the present invention; and

FIG. 2 is a flowchart showing CDMA wireless channel

allocation according to the present invention.

* Reference numerals of several elements in the drawings *

101: RF (Radio Frequency) processor

102: received signal intensity measurer

103: correlator (or match filter)

104: channel processor

105: BS (Base Station) controller

[DETAILED DESCRIPTION OF THE INVENTION]

The present invention relates to a CDMA wireless channel allocation method enabling a handoff channel reservation so that terminal users in a CDMA (Code Division Multiple Access) cellular system are provided with improved quality (grade) of services.

In general, handoff (i.e. communication channel switching) refers to the switching of wireless links so that the communication path between BSs remains connected.

Particularly, during handoff, the BS selects a channel having the best field strength received by terminals so that the communication path remains intact. However, if a cellular system fails to hand off properly, the call tends to drop during communication.

Such a call drop has a worse influence on users than a failed call seed (call blocking).

The influence is evaluated in terms of GOS (Grade of

Service) according to DECT (Digital European Cordless Telephone) standards. Therefore, it is customary to reserve a dedicated handoff channel to improve the GOS. However, the ever-changing CDMA link capacity makes it difficult to efficiently reserve a dedicated handoff channel.

In the case of a CDMA system based on SS (Spread Spectrum), the wireless link capacity varies depending on the interference included in the wireless link, even if the bandwidth is the same, unlike FDMA (Frequency Division Multiple Access) or TDMA (Time Division Multiple Access) systems.

In addition, the capacity of uplinks (wireless links leading from terminals to BSs) is smaller than that of downlinks (wireless links leading from BSs to terminals). This means that the wireless link capacity of CDMA systems depends on the capacity of the uplinks.

For example, assuming that the GOS is expressed in terms of Eb/No, the value of which is 7dB, the CDMA link capacity N is given as follows according to IS-95 Standards relating that the bandwidth is 1.2288MHz and that the information transmission rate of a user is 9.6Kbps.

However, when it comes to the actual link capacity of CDMA cellular systems, the voice activity, background noise, and sectorization effect must also be considered.

In particular, the interference received by BSs is

received not only by those using their own cells, but also those using external cells. The interference in external cells varies depending on external environments, such as radio wave characteristics, handoff region size, etc.

In summary, the CDMA link capacity depends on external environments. Therefore, it is uneconomical to allocate CDMA wireless channels based on fixed link capacity, because available channels of wireless links are not fully availed of. Instead, it is efficient to allocate wireless link channels based on the received interference.

However, no conventional methods properly consider a dedicated handoff channel and still fail to improve the GOS. It is even more difficult to reserve a dedicated handoff channel in the case of varying capacity.

Accordingly, the present invention has been made to solve the above-mentioned problems occurring in the prior art, and an object of the present invention is to provide a CDMA wireless channel allocation method enabling a handoff channel reservation so that, as a scheme for allocating a wireless link channel between a base station and a mobile station (or personal portable terminal), a dedicated handoff channel is reserved to allocate channels and provide users with improved quality (grade) of services.

In order to accomplish this object, the present invention provides a method for allocating a wireless

channel according to the intensity of signals received by a base station in a CDMA cellular system so that a handoff channel can be reserved, the method including a first step of subtracting currently received signal intensity from a first total interference margin (TIM) and a second total interference margin (TIM-1) set by the base station to calculate a current signal intensity margin (CIM) and a handoff signal intensity margin (HIM), respectively; a second step of checking if signal intensity necessary to allocate a channel for a call exceeds the current signal intensity margin (CIM) when the channel has been requested after the first step; a third step of checking if the requested call is handoff when it has been confirmed in the second step that the signal intensity necessary to allocate the channel exceeds the current signal intensity margin (CIM); and a fourth step of allocating new wireless channels until the signal intensity necessary to allocate the channel does not exceed the handoff signal intensity margin (HIM) when it has been confirmed in the third step that the requested call is handoff.

Hereinafter, the present invention will be described in detail with reference to the accompanying drawings.

FIG. 1 shows the construction of a BS receiver necessary to efficiently allocate wireless channels. The BS receiver includes an RF processor 101 for receiving RF

signals modulated on a wireless basis, a number of correlators (or match filters) 103 for detecting digital signals from the modulated RF signals, a number of channel processors 104 for decoding the digital signals, which have been demodulated by the correlators (or match filters) 103, into original digital signals channel by channel, and a BS controller 105 for managing and controlling these components.

The BS receiver further includes a received signal intensity measurer 102 for measuring the intensity of the modulated signals received by the RF processor 101, before they are transferred to the correlators 103, and transmitting the measured intensity to the BS controller 105.

The intensity of received signals is substantially equal to the interference received by the correlators 103.

FIG. 2 is a flowchart showing steps for reserving a dedicated handoff channel by the BS controller 105 shown in FIG. 1 and efficiently allocating CDMA wireless channels. The steps will now be described with reference to FIG. 2.

In step 1 (S1), the BS controller 105 sets two total interference margins TIM and TIM-1 allocated by the network.

The difference between the TIM and TIM-1 depends on the product of the number of handoff channels to be

reserved and the increase in received signal intensity resulting from the allocation of a channel.

In step 2 (S2), the received signal intensity (i.e. received interference) measured by the received signal intensity measurer 102 is read at a cycle smaller than the channel request cycle. Particularly, it is enough to read the received signal intensity at a cycle corresponding to 1/10 of the channel request cycle.

In step 3(S3), the currently read interference is subtracted from the two total interference margins TIM and TIM-1 obtained in step 2, respectively, to calculate two signal intensity margins CIM (current IM) and HIM (Handoff IM).

If a new call or handoff requests in step 4 (S4) that a new wireless channel be allocated, the signal intensity (power) necessary to allocate a channel for the call is calculated in step 5 (S5).

In case of a voice service provided in the worst condition, the signal intensity is fixed. In step 6 (S6), it is checked if the signal intensity necessary for the wireless channel allocation exceeds the CIM. If it is confirmed as a result of the check that the CIM is not exceeded, a new wireless channel is allocated in step 7 (S7). If it is confirmed in the check (S6) that the CIM is exceeded, it is determined if the requested call is handoff

in step 8 (S8). If it is confirmed that the requested call is handoff, it is checked in step 9 (S9) if the signal intensity necessary for channel allocation calculated in step 5 (S5) exceeds the HIM.

If it is confirmed in the check (S9) that the HIM is not exceeded, a new wireless channel is allocated as in step 7 (S7). If the HIM is exceeded, the request for the wireless channel allocation is rejected in step 10 (S10). This will be described in more detail with reference to FIG. 2.

The BS controller 105 sets total interference margins allocated by the network. For example, the first total interference margin TIM is set to be 90, and the second total interference margin TIM-1 is set to be 100 (S1).

The unit of each number is omitted for convenience of description. The currently received interference resulting from external environments is read by the received signal intensity measurer (S2).

The two signal intensity margins CIM and HIM are calculated as follows (S3). Assuming that the currently received and read interference (i.e. received signal intensity) is 60, the current intensity margin (hereinafter, referred to as CIM) is obtained by subtracting the currently read interference 60 from TIM=90, and becomes 30. Similarly, the handoff intensity margin

(hereinafter, referred to as HIM) is obtained by subtracting the currently read interference 60 from TIM-1=100, and becomes 40.

Alternatively, if the currently received and read interference is 80, the calculation result is CIM=10, HIM=20.

To give another example, if the currently received and read interference is 90, the calculation result is CIM=0, HIM=10. If a new call or handoff requests that a new wireless channel be allocated (S4), signal intensity (or power consumption) necessary for the wireless channel allocation is calculated (S5).

It is assumed that the signal intensity necessary to allocate a channel is 1 (this can be varied at any moment).

Based on this assumption, the signal intensity necessary to allocate ten channels (i.e. signal intensity necessary to secure ten channels) is 10. Besides this assumption, if the currently received signal intensity is 60 and if a new channel is requested, as mentioned above, the signal intensity necessary to allocate a new channel (i.e. 1) does not exceed CIM=30, which has been calculated in S3. This means that a new wireless channel can be allocated.

However, if the currently received signal intensity is 90 and if a channel is requested, the signal intensity

necessary to allocate a new channel (i.e. 1) exceeds CIM=0, which has been calculated in S3 (according to S6). In this case, dedicated handoff channels, which have been reserved, are solely used.

Particularly, if the signal intensity necessary to allocate a new channel exceeds the CIM and if the requested call is not handoff (S8), a normal call is rejected. However, if the requested call is handoff (S8), a new wireless channel is allocated because the signal intensity (i.e. 1) necessary for channel allocation calculated in S5 does not exceed HIM=10 calculated in S3.

If the signal intensity 1 exceeds the HIM, the wireless channel allocation is rejected because all dedicated handoff channels have been used (S10).

The above examples confirm that, according to the present invention, dedicated handoff channels can be reserved in the case of varying link capacity.

As mentioned above, the present invention can maximize the efficiency of CDMA wireless resources by classifying the signal intensity margins by the BS receiver of a CDMA system and allocating wireless channels accordingly.

In addition, reservation of dedicated handoff channels improves service quality.

Furthermore, easy implementation makes it possible to expect an economic CDMA system.

(57) WHAT IS CLAIMED IS:

1. A method for allocating a wireless channel according to intensity of signals received by a base station in a CDMA cellular system so that a handoff channel can be reserved, the method comprising:

a first step of subtracting currently received signal intensity from a first total interference margin (TIM) and a second total interference margin (TIM-1) set by the base station to calculate a current signal intensity margin (CIM) and a handoff signal intensity margin (HIM), respectively;

a second step of checking if signal intensity necessary to allocate a channel for a call exceeds the current signal intensity·margin (CIM) when the channel has been requested after the first step;

a third step of checking if the requested call is handoff when it has been confirmed in the second step that the signal intensity necessary to allocate the channel exceeds the current signal intensity margin (CIM); and

a fourth step of allocating new wireless channels until the signal intensity necessary to allocate the channel does not exceed the handoff signal intensity margin (HIM) when it has been confirmed in the third step that the requested call is handoff.

DRAWINGS

FIG. 1

101: RF PROCESSOR

102: RECEIVED SIGNAL INTENSITY MEASURER

103: CORRELATOR OR MATCH FILTER

104: CHANNEL PROCESSOR

105: BS CONTROLLER

FIG. 2

S1: SET TOTAL INTERFERENCE MARGINS (TIM, TIM-1)

S2: READ RECEIVED INTERFERENCE

S3: CALCULATE SIGNAL INTENSITY MARGINS (CIM, HIM)

S4: CHANNEL REQUEST EXISTS?

예: YES

아니오: NO

S5: CALCULATE CHANNEL ALLOCATION POWER CONSUMPTION

S6: CIM EXCEEDED?

S7: ALLOCATE NEW WIRELESS CHANNEL

S8: HANDOFF?

S9: HIM EXCEEDED?

S10: REJECT WIRELESS CHANNEL ALLOCATION